Harrow
Local Economic Assessment
2019 - 2020

Environmental Infrastructure and Sustainability

Harrow COUNCIL
LONDON

12.1 Climate change focuses our attention on the way we interact with our environment and use its resources. Managing air quality, reducing the amount of waste that is produced, using energy more efficiently and learning to use water sustainably will help maintain and improve environmental standards and quality of life in the borough and the region.

Air Quality

Carbon dioxide

12.2 Carbon dioxide (CO_2) is the main greenhouse gas, accounting for about 81% of the UK greenhouse gas emissions in 2017. In recent years, increasing emphasis has been placed on the role of regional bodies and local government in contributing to energy efficiency improvements, and hence reductions in carbon dioxide emissions.

12.3 In 2017 Harrow had the lowest levels of CO_2 emissions per capita of the West London boroughs at 2.4 tonnes per capita and was ranked third of all the London boroughs (where 1st is the borough with the lowest CO_2 emissions). Hackney had lowest emissions per capita of the London boroughs at 2.3 tonnes, whilst the City of London had the highest at 97.9 tonnes. Data for 2018 was not yet available at the time of writing.

Table 12.1: Carbon dioxide emissions per capita estimates, 2017

	Per Capita Emissions (t)	Rank in London
Harrow	2.4	3
Barnet	3.2	18
Brent	2.8	11
Ealing	3.4	22
Hammersmith & Fulham	3.7	26
Hillingdon	4.7	30
Hounslow	3.8	27
London	3.4	-
England	5.1	-

Source: Department for Business, Energy & Industrial Strategy
Note: The data show emissions allocated on an "end-user" basis where emissions are distributed according to the point of energy consumption (or point of emission if not energy related). Except for the energy industry, emissions from the production of goods are assigned to where the production takes place. Therefore, emissions from the production of goods which are exported will be included, and emissions from the production of goods which are imported are excluded.

12.4 There was a 47% reduction in emissions per capita in Harrow over the 12 years from 2005 to 2017, from 4.50 tonnes per capita down to 2.39 tonnes per capita. There are multiple reasons for this including reduced fuel consumption by business and industry due to increased efficiency and a shift towards lighter industries, an increase in the energy efficiency of homes and more fuel efficient vehicles.

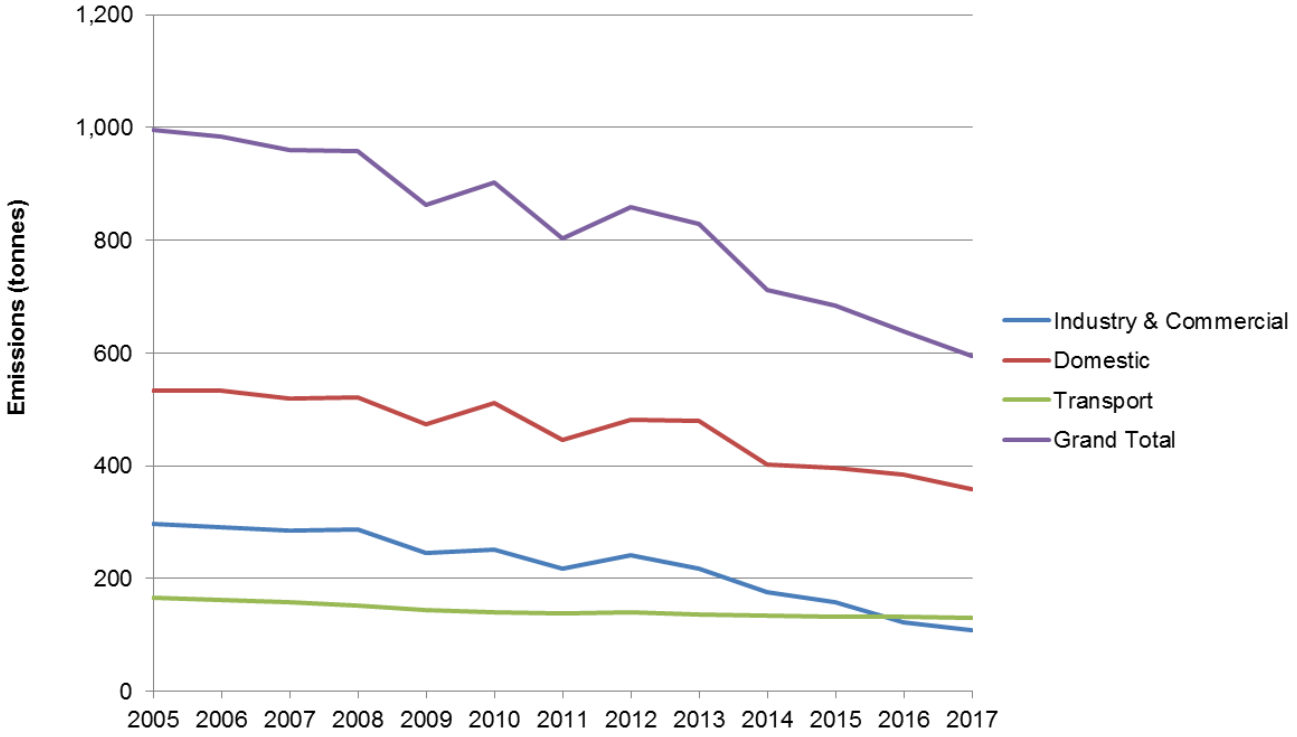
Table 12.2: Carbon dioxide emission estimates, Harrow, 2005-2017

Year	CO_2 emissions (kt)				Per Capita Emissions (t)
	Industry & Commercial	Domestic	Transport	Grand Total	
2005	297.8	532.7	165.8	995.3	4.5
2006	290.5	532.7	161.2	983.2	4.4
2007	284.8	519.1	158.2	960.9	4.2
2008	287.1	521.5	151.6	958.8	4.2
2009	246.3	474.2	144.4	863.5	3.7
2010	251.2	512.4	140.7	902.8	3.8
2011	218.6	446.7	139.0	802.6	3.3
2012	241.0	481.1	139.4	859.8	3.6

Year	CO_2 emissions (kt)				Per Capita Emissions (t)
	Industry & Commercial	Domestic	Transport	Grand Total	
2013	217.3	479.3	135.3	830.1	3.4
2014	176.7	403.2	134.0	712.1	2.9
2015	157.9	396.6	131.7	684.2	2.8
2016	122.6	384.5	132.8	637.8	2.6
2017	108.8	359.3	129.9	595.8	2.4

Source: Department for Business, Energy & Industrial Strategy
Note: The data show emissions allocated on an "end-user" basis where emissions are distributed according to the point of energy consumption (or point of emission if not energy related). Except for the energy industry, emissions from the production of goods are assigned to where the production takes place. Therefore, emissions from the production of goods which are exported will be included, and emissions from the production of goods which are imported are excluded.

Figure 12.1: Carbon dioxide emission estimates, Harrow, 2005-2017



Source: Department for Business, Energy & Industrial Strategy

12.5 Domestic sources are the largest contributors to carbon dioxide emissions in Harrow, accounting for 60% of the total emissions for the borough in 2017. Industrial and commercial sources were the second main contributors up until 2016 when their level dropped below that of transport. Industrial emissions have declined due stricter pollution controls and increased efficiency in recent years, although a major contributing factor was the decline and subsequent closure of the Kodak factory in 2016 as shown in the table below.

Table 12.3: Carbon dioxide emission estimates at Harrow's Kodak Factory, 2005-2017

Year	Operator	CO_2 emissions (kt)
2005	Kodak Ltd	73.37
2006	Kodak Ltd	64.72
2007	Kodak Ltd	51.60
2008	Kodak Ltd	44.86
2009	Kodak Ltd	41.61

Year	Operator	CO_2 emissions (kt)
2010	Kodak Ltd	40.98
2011	Kodak Ltd	28.37
2012	Kodak Ltd	28.01
2013	111616 Opco (UK) Ltd*	28.00
2014	111616 Opco (UK) Ltd*	25.66
2015	111616 Opco (UK) Ltd*	18.29
2016	111616 Opco (UK) Ltd*	16.71
2017	-	-

Source: Department for Business, Energy & Industrial Strategy
**Also trading as Kodak Alaris Limited*

Nitrogen Dioxide and Particulate Matter PM_{10}

12.6 Between 1999 and 2003 the London Borough of Harrow undertook its first round of Review and Assessment of air quality, which concluded that the NO_2 (nitrogen dioxide) annual mean and the 24-hour mean PM_{10} (particulate matter with a diameter less than 10 microns) National Air Quality Strategy Objectives were being exceeded. As a result, an Air Quality Management Area (AQMA) was designated for both pollutants across the borough. Following this, the council prepared an Air Quality Management Plan to work towards achieving the Objectives. As most of such pollution arises from road transport emissions, most of the actions have been focused on reducing these.

12.7 The National Objective for both NO_2 and PM_{10} is an annual mean of 40 µg/m^3. Continuous monitoring of nitrogen dioxide and PM_{10} has been carried out at two sites in Harrow for several years. The first site, Harrow 1 is located in Stanmore and is a background monitoring site. The results from Harrow 1 will be indicative of levels experienced at a large proportion of homes. Background levels will mostly reflect London-wide and regional pollution levels, with only a relatively small contribution from local traffic The second site, Harrow 2 is located next to Pinner Road and is a roadside monitoring site. This data will reflect pollution levels from traffic.

Table 12.4: Annual mean concentrations for PM_{10} and Nitrogen Dioxide (µg/m^3) at Harrow 1 background monitoring site

Harrow 1 - Stanmore	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Annual Mean ug/m^3 (PM_{10})	17.2	17	20	18	19	16	14	16	20	15
Annual Mean ug/m^3 (Nitrogen Dioxide)	n/a	27	25	25	24	22	22	26	33	20

Source: Londonair.org.uk

12.8 The data show fairly consistent levels for Harrow 1 in recent years, whereas at Harrow 2 there has been a downward trend for both PM_{10} and NO_2. For nitrogen dioxide, Harrow 1 has consistently been below the National Objective (40 µg/m^3). Harrow 2 has consistently been above the National Objective, however in 2018 the annual mean value was better the National Objective for the first time. PM_{10} levels have been below the National Objective at both sites since 2009.

12.9 Roadside levels of these pollutants at Harrow 2 have reduced largely due to increasing stringent requirements for new vehicle emissions. The latest, Euro 6, was introduced for all new heavy goods vehicles and buses from January 2014, September 2015 for cars and light vans and September 2016 for larger vans up to and including 3.5 tonnes gross vehicle weight. Additionally the London Low Emission Zone (LEZ) which covers most of Greater London including Harrow encourages the most polluting heavy diesel vehicles to become cleaner by charging those which do not meet the set requirements. From 26

October 2020, Low Emission Zone (LEZ) emissions standards will get tougher for heavy vehicles and broadly those which do not meet the meet the Euro 6 standard will have to pay. Harrow Council operates several zero-emission, electric and hybrid vehicles in its fleet, and intends to develop a borough-wide policy to help increase the uptake of electric vehicles by local residents and businesses.

Table 12.5: Annual mean concentrations for PM_{10} and Nitrogen Dioxide ($\mu g/m^3$) at Harrow 2 roadside monitoring site

Harrow 2 - Pinner Road	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Annual Mean ug/m^3 (PM_{10})	24	24	25	27	26	25	20	21	20	19
Annual Mean ug/m^3 (Nitrogen Dioxide)	46	54	47	47	42	48	40	44	41	39

Source: Londonair.org.uk

12.10 Background levels of these pollutants in Harrow are likely to be helped by various air quality schemes introduced in London by the Mayor recently such as the implementation of an ultra-low emission zone for road transport in central London in April 2019, which will expand to include the North and South Circular from October 2021. TfL has stated that all new double-decker buses are now hybrid or zero-emission and no new diesel taxis will be licensed. The Mayor's Air Quality Fund (MAQF) supports projects by London boroughs to improve air quality by making £22 million available over 10 years for schemes such as Low Emission Neighbourhoods.

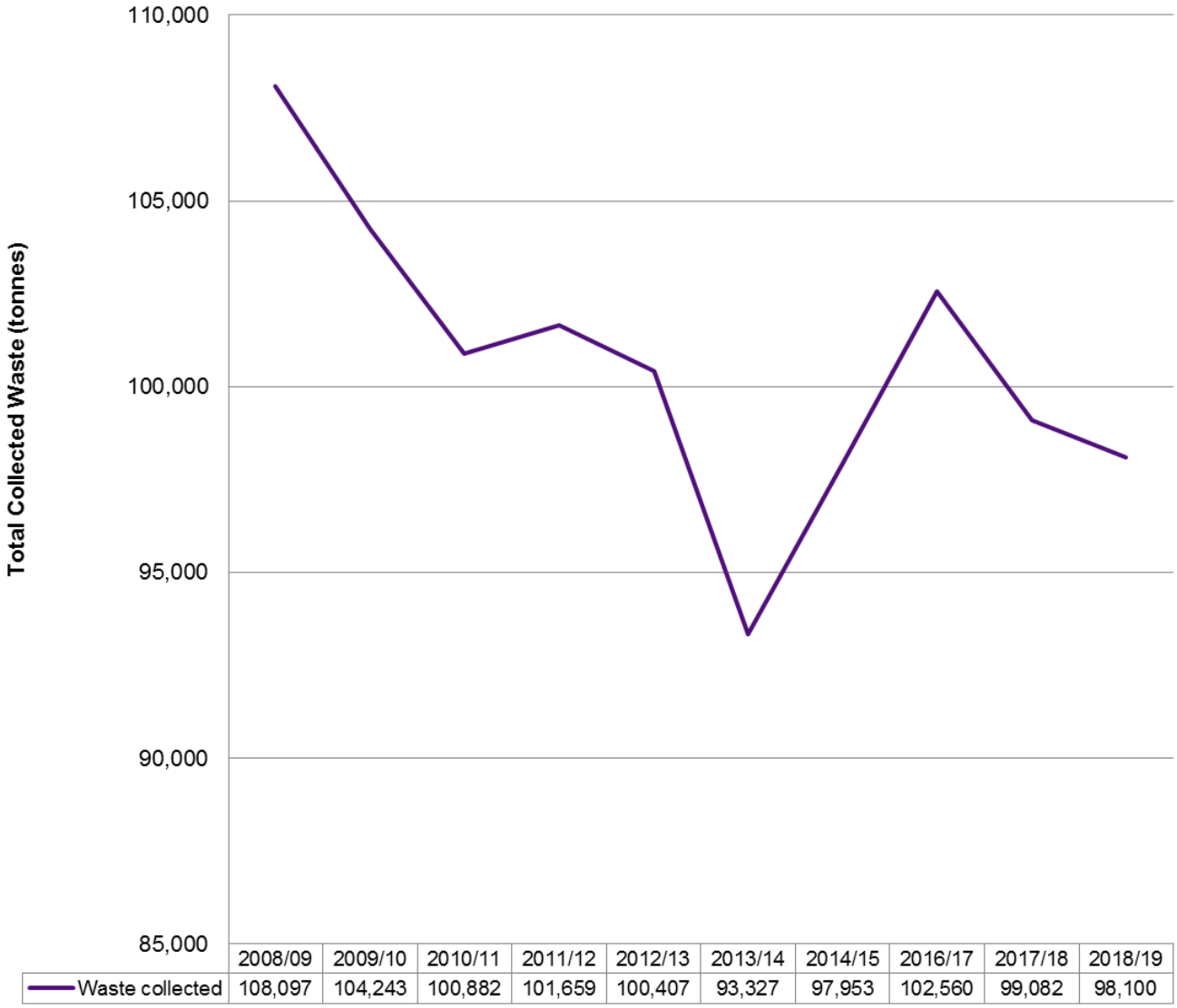
Waste

12.11 In 2015 London produced just under 18 million tonnes of waste comprising 17% household waste, 28% commercial/industrial waste and 54% construction, demolition and excavation waste. The Draft New London Plan sets out that the equivalent of 100% of London's waste should be managed within London (i.e. net self-sufficiency) by 2026 and promotes the 'Circular Economy' i.e. resources are kept in use for as long as possible and then recovered and regenerated at the end of each service life. The London Mayor is committed to:

- ensuring that there is zero biodegradable or recyclable waste sent to landfill by 2026
- meeting or exceeding the recycling targets for each of the following waste streams:
  - municipal waste - 65% by 2030
  - construction, demolition and excavation waste - 95% by 2020
- generating low-carbon energy in London from suitable remaining waste

12.12 There has been an overall reduction of just under 10% in municipal waste arising in the borough from 2008/09 to 2018/19. There have been annual fluctuations with a notable drop in 2013/14 and sharp rise in 2016/17. The overall decline in municipal waste has been achieved despite the population of Harrow having increased by some 20,000 people over the same timeframe.

Figure 12.2: Local authority collected waste in Harrow per annum (tonnes)



	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2016/17	2017/18	2018/19
Waste collected	108,097	104,243	100,882	101,659	100,407	93,327	97,953	102,560	99,082	98,100

Source: WasteDataFlow, Department for Environment, Food and Rural Affairs (Defra)

12.13 Table 12.6 shows that the recycling, composting and reuse levels achieved by boroughs is uneven across West London with the best performing borough (Ealing) achieving over the twice the rate than the worst performing borough (Hammersmith & Fulham). Harrow is ranked 8th out of the 33 London boroughs. Generally, boroughs in denser urban settings (with more flats above shops and housing estates), such as Hammersmith & Fulham, would be expected to perform worse than Outer London boroughs with more conducive housing types.

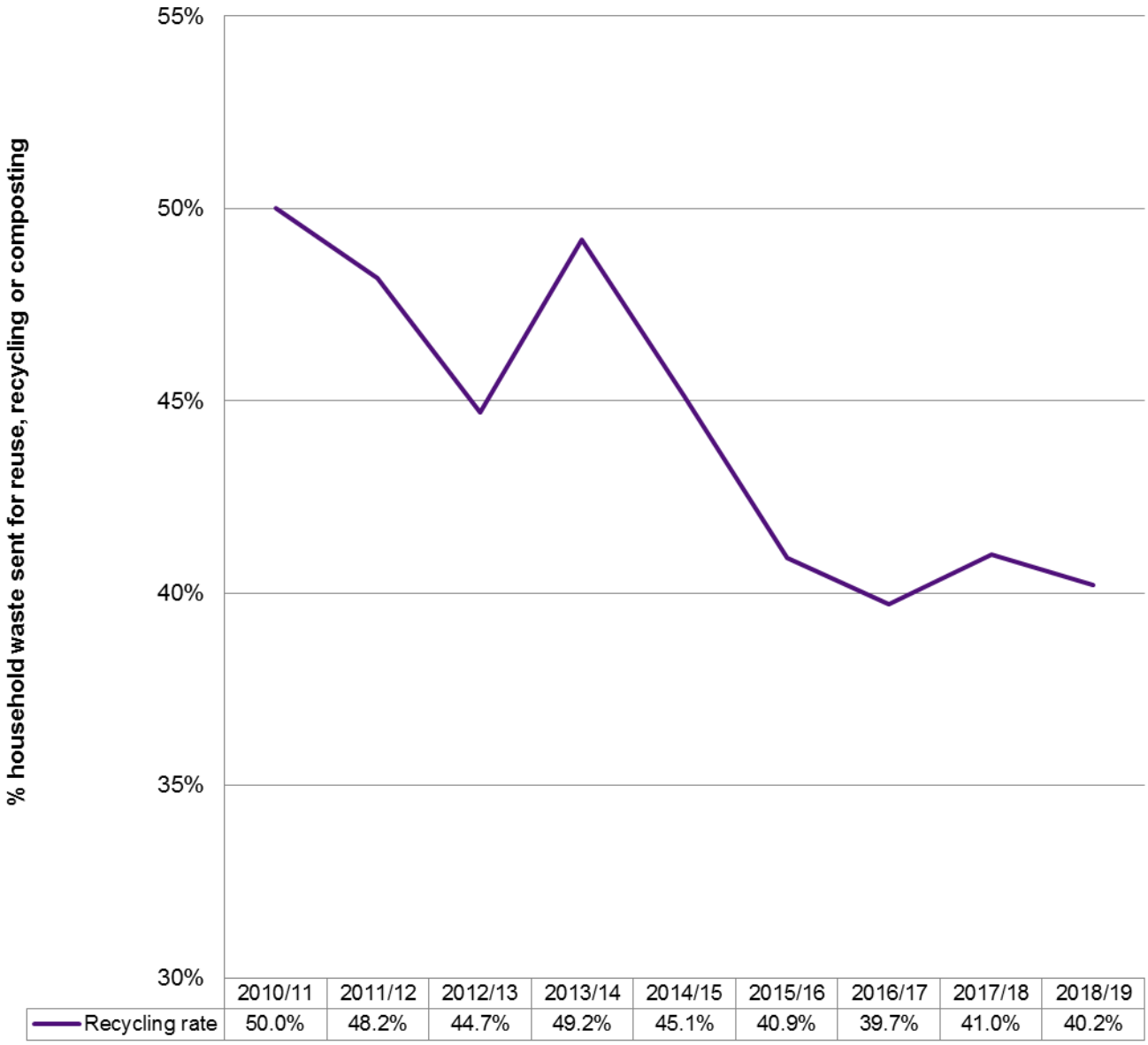
Table 12.6: Tonnage and percentage of household waste which was recycled, composted or reused by collection authorities, 2018/19

Borough	Recycling-composting-reuse (tonnes)	Percentage recycled-composted-reused	London Rank
Harrow	36,056	40.2%	8
Barnet	48,578	34.6%	14
Brent	34,548	36.6%	12
Ealing	42,778	52.6%	2
Hammersmith & Fulham	11,184	23.8%	28
Hillingdon	36,583	36.7%	11
Hounslow	26,955	31.4%	18

Source: WasteDataFlow, Department for Environment, Food and Rural Affairs (Defra), 2018/19

12.14 In 2018/19 the rate of household waste recycled, composted or reused by Harrow (as a collection authority) was 40.2%. This was a slight decrease from the previous year and substantially lower than in 2010/11 when the rate was 50%. The average for the West London boroughs was 37.6% in 2018/19 which is someway off the 65% the Mayor hopes to achieve by 2030.

Figure 12.3: Reuse, recycling or composting of Harrow household waste per annum



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Recycling rate	50.0%	48.2%	44.7%	49.2%	45.1%	40.9%	39.7%	41.0%	40.2%

Source: WasteDataFlow, Department for Environment, Food and Rural Affairs (Defra)

12.15 Waste that cannot be recycled/composted/reused is sent to the West London Waste Authority, the statutory body responsible for waste disposal for the seven West London boroughs, including Harrow. In the past, the majority of this waste would have ended up in landfill. However in 2017/18 the West London Waste Authority sent 20,992 tonnes or just 3% of all remaining waste to landfill. The vast majority of waste is now incinerated at Energy Recovery Facilities which provides energy for the National Grid.

Gas and Electricity Consumption

12.16 The Department for Business, Energy & Industrial Strategy publish information on gas and electricity consumption at a local authority level, for both domestic and non-domestic consumers.

Gas

12.17 In 2018 total gas consumption in Harrow was 1,689 GWh. Domestic customers accounted for 85.3% of gas consumption in Harrow, jointly (with Redbridge) the highest level of any London borough. This is likely to be due to a low level of industries which require large amounts of gas, for example the manufacturing sector. Harrow also has the highest median domestic consumption of all London boroughs, due to the predominance of larger family housing rather than flats or terraces or which in general are more energy efficient. Harrow's housing stock is also aging and likely to have poor energy efficiency by modern standards.

Table 12.7: Gas Consumption, 2018

Area	Non-domestic consumers			Domestic consumers			All consumers
	Sales 2018 (GWh)	% of total sales	Median non-domestic consumption (kWh)	Sales 2018 (GWh)	% of total sales	Median domestic consumption (kWh)	Sales 2018 (GWh)
Harrow	249	14.7%	136,639	1,441	85.3%	15,691	1,689
Barnet	578	20.7%	113,696	2,210	79.3%	14,366	2,787
Brent	589	27.6%	142,294	1,548	72.4%	12,981	2,137
Ealing	731	30.1%	147,271	1,695	69.9%	12,457	2,426
Hammersmith & Fulham	580	39.3%	161,595	895	60.7%	9,629	1,475
Hillingdon	693	32.1%	164,360	1,463	67.9%	13,369	2,156
Hounslow	583	32.9%	166,263	1,190	67.1%	12,382	1,773
Inner London	12,459	46.9%	164,229	14,110	53.1%	9,474	26,570
Outer London	8,213	23.5%	138,151	26,763	76.5%	12,916	34,976
England	157,651	36.3%	147,983	276,404	63.7%	11,759	434,055

Source: Department for Business, Energy & Industrial Strategy
Note: GWh is Giga Watt hours, KWh is Kilo Watt hours

Electricity

Table 12.8: Electricity Consumption, 2018

Area	Non-domestic consumers			Domestic consumers			All consumers
	Sales 2018 (GWh)	% of total sales	Median non-domestic consumption (kWh)	Sales 2018 (GWh)	% of total sales	Median domestic consumption (kWh)	Sales 2018 (GWh)
Harrow	218	39.0%	7,237	341	61.0%	2,930	559
Barnet	499	45.1%	6,218	608	54.9%	2,992	1,107
Brent	774	65.0%	4,157	417	35.0%	2,645	1,191
Ealing	884	65.4%	6,308	467	34.5%	2,681	1,352
Hammersmith & Fulham	688	70.9%	3,243	283	29.1%	2,328	971
Hillingdon	945	69.3%	9,097	417	30.6%	3,026	1,363
Hounslow	924	71.0%	7,152	378	29.0%	2,859	1,302
Inner London	15,629	75.6%	5,161	5.055	24.4%	2,363	20,684
Outer London	9,618	56.2%	5,767	7,499	43.8%	2,880	17,116
England	145,186	62.2%	6,948	88,112	37.8%	2,866	233,298

Source: Department for Business, Energy & Industrial Strategy
Note: GWh is Giga Watt hours, KWh is Kilo Watt hours

12.18 In 2018 total electricity consumption in Harrow was 559 GWh, the lowest amount in West London. Domestic customers accounted for 61% of electricity consumption in Harrow, which was the highest level for any London borough and well above the national average. Median domestic usage was

higher than average for London, but was not the highest. The reasons for a high proportion of domestic use to non-domestic use are likely to be similar to those discussed above for gas.

District Heating Networks

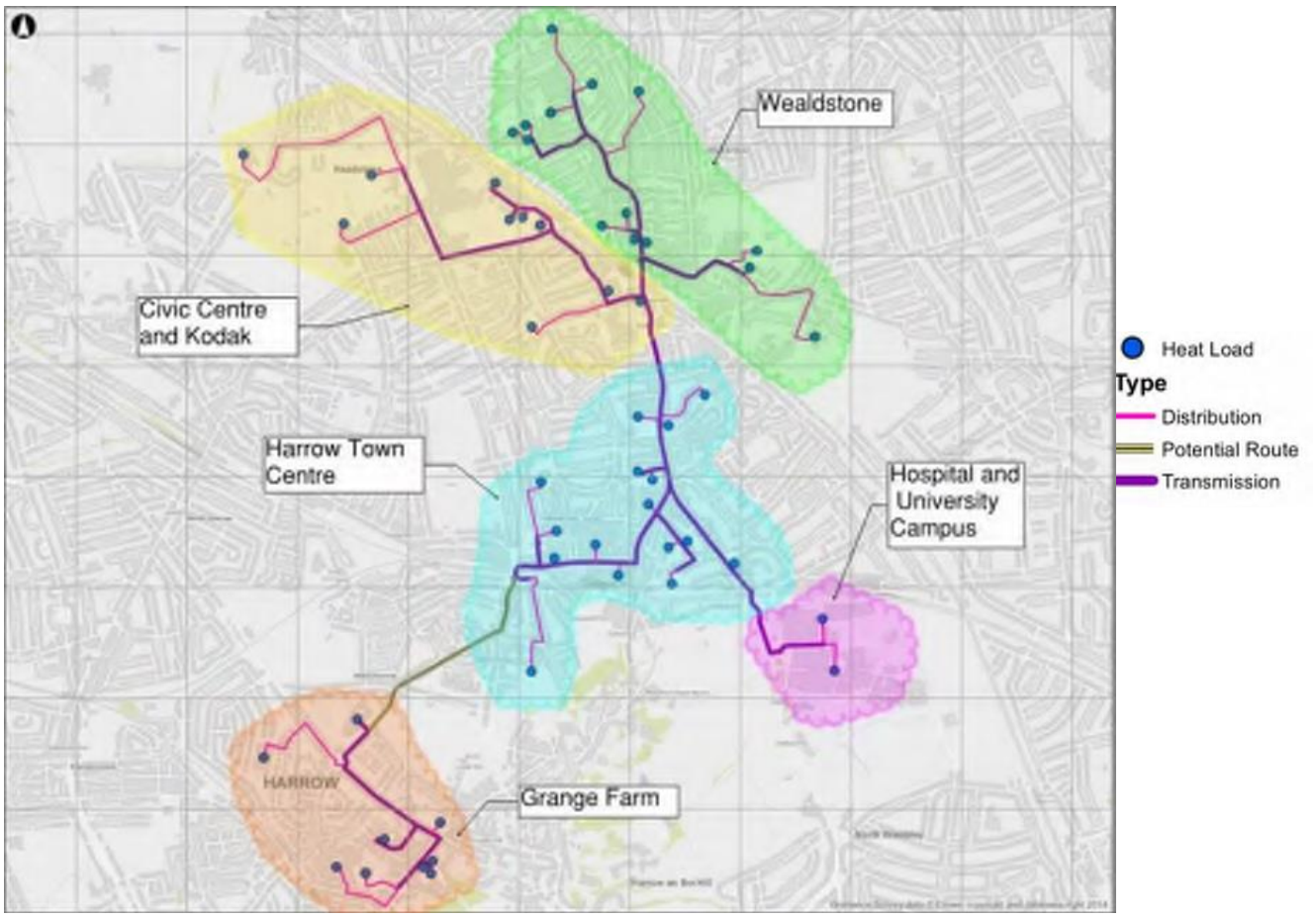
12.19 District heating represents one way to reduce greenhouse gas emissions nationally and improve local air quality. It also has the potential to help reduce local fuel poverty. District heating captures and distributes heat from low carbon energy sources such as electricity generating stations, combined heat and power facilities and large scale heat pumps.

12.20 Arup produced an Energy Masterplan for Harrow and Wealdstone and Grange Farm in 2016. This report provides a useful overview of the basic principles of district heating networks from which the following text is taken.

> Decentralised energy refers to the generation and distribution of energy closer to the locations where energy is consumed. Currently, over 90% of electrical generating capacity in the UK comes from a small number of very large generating stations, most of which are in remote locations away from population centres. This approach creates a variety of inefficiencies in the overall energy system, of which the greatest is the inability to use the spare heat from power stations for beneficial purposes. By locating a generating station close to where the energy is used, decentralised energy offers the potential for the spare heat to be captured and distributed to buildings or industrial processes which need it.
>
> District heating (DH) networks provide the means by which heat from decentralised generation sources is supplied to connected buildings. Buildings are typically connected to the network via plate heat exchangers or heat interface units that replace individual boilers for space heating and domestic hot water. Cooling can also be provided to the same buildings through the use of absorption chillers powered from the thermal energy in the heat network, or by constructed separate cooling networks.
>
> Heat for DH networks is most commonly supplied from a combined heat and power plant (CHP) such as a gas engine or an energy from waste plant. The high grade (or high temperature) heat is used to generate electricity while the lower grade heat is captured and distributed through the network. There are around 2,000 CHP schemes across the UK totalling over 6,000MW of electricity generating capacity (MWe) and 22,000MW of heat capacity (MWth).
>
> Due to the significant capital investment required for new pipework and building connections, district heating networks are best suited for high “heat density” areas which can ensure enough revenues for a long term return on investment. New development sites in particular provide an opportunity to design in the connection from the start, which can reduce the cost of connection (compared with retrofit of existing buildings) and provide economies of scale for network operation, while meeting carbon reduction targets in a cost-effective way.
>
> *Energy Masterplan for Harrow & Wealdstone and Grange Farm, Arup, 2016*

12.21 Following close examination of the potential requirements of Harrow & Wealdstone Opportunity Area and the Grange Farm housing estate regeneration area, Arup proposed the Harrow Heat Network masterplan. This is based on a central energy centre located at the Civic Centre including gas fired CHP. However, Arup acknowledge that the analysis demonstrated that an area-wide network is not currently financially viable over either 25 or 40 year time period analysis. Arup suggests a cluster approach would be required to take advantage of windows of opportunity and use a phased approached as shown below.

Figure 12.4: Harrow Heat Network cluster approach



Source: Energy Masterplan for Harrow & Wealdstone and Grange Farm, Arup, 2016

12.22 Arup's final masterplan comprises three main heat network clusters (North, South and Grange Farm), each with an identified energy centre location. Modelling for each cluster found that they could achieve positive returns on investment over 25 and 40-year time periods. The route assessment indicates that the networks are likely to be feasible, although some key routing challenges have been identified, typically where railway crossing are required. A Council-led business model is recommended.

Pressure on Water

12.23 South East England is an area the Environment Agency have described as having 'serious water stress'. Water scarcity/stress occurs when demand outstrips supply. The Water Resources Long Term Planning Framework (2015-2065) report published by Water UK in 2016 used new modelling techniques that clearly show in the future we will face more frequent and severe droughts than previously estimated.

12.24 London's households use more than 1.2 billion litres of water every day - an average of 160 litres per person. Households use the most water within London (approximately 60% of total water use) (Source: Environment Agency). Supplying such a large amount of clean water to people's homes is a significant challenge, and one which will become more difficult in the future.

12.25 Action will be needed to balance the supply and demand of water in London. If housing growth reaches the target of 33,400 new homes a year, the water companies will need to manage a potential cumulative deficit of 360 megalitres a day by 2031. They will have to do this by:

- reducing demand; or
- increasing supply; or
- a combination of the two.

12.26 Demand side interventions may include water metering, increased water efficiency (e.g. retrofitting in existing homes, more efficient water use in appliances such as washing machines) and tighter building standards. In 2015 Building Regulations were updated to include the requirement for all new dwellings to achieve a water efficiency standard of 125 litres of water per person per day. In the same year, the Government updated Building Regulations Part G, introducing an 'optional' requirement of 110 l/p/day for new residential development, which should be implemented through local policy where there is a clear evidence need.